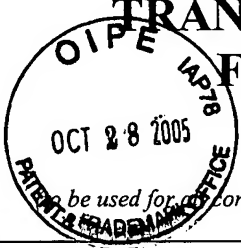
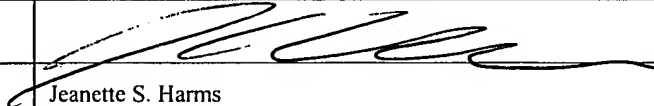


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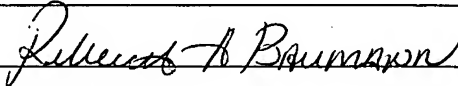
 <p>TRANSMITTAL FORM</p> <p><i>to be used for all correspondence after initial filing</i></p>		Application Number	10/040,055
		Filing Date	12/31/2001
		First Named Inventor	James K. Falbo
		Art Unit	2825
		Examiner Name	Yelena Rossoshek
Total Number of Pages in This Submission	14	Attorney Docket Number	NTI-030

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appellants: James K. Falbo et al.

Assignee: Synopsys Inc.

Title: SHAPE-BASED GEOMETRY ENGINE TO PERFORM SMOOTHING
AND OTHER LAYOUT BEAUTIFICATION OPERATIONS

Serial No.: 10/040,055 File Date: December 31, 2001

Examiner: Yelena Rossoshek Art Unit: 2825

Docket No.: NTI-030

October 25, 2005

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REPLY BRIEF

Sir:

This Reply Brief, filed in triplicate, responds to the
Examiner's Answer dated September 9, 2005.

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B. STATUS OF CLAIMS

Claims 11, 33, 37-43, and 55-99 are pending. Claims 1-10, 12-32, 34-36, and 44-54 are cancelled. Claims 11, 33, 37-43, and 55-99 stand rejected.

Rejected Claims 11, 33, 37-43, and 55-99 are appealed.

C. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The following issues are presented to the Board of Appeals for decision:

(A) Whether Claims 11, 33, 37-43, and 55-99 are patentable under 35 U.S.C. 102(e) over U.S. Patent 6,523,162 (Agrawal).

(B) Whether minor objections prevent a review on the merits.

D. ARGUMENTS

1. Claims 11, 33, 37-43, and 55-99 are still patentable under 35 U.S.C. 102(e) over U.S. Patent 6,523,162 (Agrawal) under the new ground of rejection

The Examiner argues that the claims to the layout beautification method/operation, specifically Claims 11, 79, 89, and 96, contain a non-limiting preamble. This ground of rejection was not presented in the Office Action dated October 16, 2003, the Final Office Action dated April 2, 2004, the Office Action (RCE) dated August 11, 2004, or the Final Office Action (RCE) dated March 11, 2005. Therefore, Appellants submit that this is a new ground of rejection presented by the Examiner on appeal.

Notably, the Examiner continues to cite passages of Agrawal as applying to the preamble in the Examiner's Answer, which clearly contradicts the Examiner's position that the preamble is not limiting. That is, these same citations were provided in the Office Action dated October 16, 2003, the Final Office Action dated April 2, 2004, the Office Action (RCE) dated August 11, 2004, and the Final Office Action (RCE) dated March 11, 2005. Appellants, in good faith, argued the inapplicability of Agrawal to layout beautification, layout imperfections, etc., but have had no opportunity until now to respond to this new ground of rejection. Appellants note the highly prejudicial timing of introducing this particular ground of rejection on appeal.

According to the Examiner in the Examiner's Answer, the claimed steps of Claims 11, 79, 89, and 96 do not recite layout beautification or layout imperfections. Appellants traverse

this characterization with respect to Claims 11 and 96. Claim 11 recites, "the first shape being configured to match a first type of layout imperfection". Claim 96 recites, "thereby removing at least one layout imperfection and reducing fracturing data volume in the layout".

As discussed by Appellants in the Appeal Brief, layout imperfections are electrically correct and yet adversely affect layout printability or device performance. Specification, paragraph [0004]. Moreover, layout imperfections can significantly increase data volume for a particular IC layout, thereby undesirably increasing layout processing (e.g. OPC, DRC, etc.) and mask production times. Thus, layout beautification, which corrects such layout imperfections, is distinct from other types of layout processing (e.g. OPC, DRC, and fracturing). The Specification, paragraph [0004] discusses this distinction, contrary to the Examiner's assertion in the Examiner's Answer. As discussed in the Appeal Brief, Agrawal fails to recognize the problem of layout imperfections and the benefits to applying shape identification to layout beautification.

The claim preamble must be read in the context of the entire claim. For example, with respect to Claims 11, 79, 89, and 96, Appellants submit that the recitations of "layout beautification" (Claims 11 and 79), "beautifying" (Claim 89), and "shape-based beautification" (Claim 96) provide context for claim construction. Specifically, these preambles indicating intended use formed Appellants' basis for distinguishing Agrawal in the prosecution history. Appellants have repeatedly argued that Agrawal fails to teach layout beautification (and similar terms), e.g. see the Office Action response dated January 5, 2004, the Final Office Action response dated May 18, 2004, and the Office Action (RCE) response dated November 11, 2004.

Under such conditions, the preamble is limiting. Metabolite Labs, Inc. v. Corp. of Am. Holdings, 370 F.3d 1354, 1358-62 (Fed. Cir. 2004). See also Catalina Mktg. Int'l v. Coolsavings.com, Inc., 289 F.3d 801, 808-09 (Fed. Cir. 2002) ("[C]lear reliance on the preamble during prosecution to distinguish the claimed invention from the prior art transforms the preamble into a claim limitation because such reliance indicates use of the preamble to define, in part, the claimed invention).

2. The non-critical features of Agrawal are not imperfections.

On page 6 of the Examiner's Answer, the Examiner characterizes the non-critical features of Agrawal as Appellants' recited imperfections. Appellants traverse this characterization.

As taught in the Specification, paragraph [0004], an imperfection is an unintended irregularity (caused by the complex interactions of various tools) that may affect printability, device performance, data volume, layout processing (e.g. OPC, DRC, etc.), and mask production times. In contrast, Agrawal teaches that a non-critical feature is one that can tolerate substantial distortion, whereas a critical feature is one that must be accurately transferred for proper IC function. Col. 3, lines 3-6. Therefore, because these two terms refer to completely different structures, Appellants submit that the non-critical features of Agrawal cannot be characterized as Appellants' recited imperfections.

3. The OPC modifications of Agrawal are not imperfections.

On page 16 of the Examiner's Answer, the Examiner characterizes the OPC modifications of Agrawal as Appellants'

recited imperfections. Appellants traverse this characterization.

As taught in the Specification, paragraph [0004], an imperfection is an unintended irregularity (caused by the complex interactions of various tools (including tools providing OPC or DRC) that may affect printability, device performance, data volume, layout processing (e.g. OPC, DRC, etc.), and mask production times. Therefore, imperfections can be caused by OPC modifications and may result in subsequent (and undesirable) OPC modifications. However, notably, imperfections are not functionally equivalent to OPC modifications as asserted by the Examiner. For these reasons, Appellants submit that the OPC modifications of Agrawal cannot be characterized as Appellants' recited imperfections.

4. Claims 56, 57, 58, 64, 67, 73, 89, 91, 96, 99 are still patentable over additional cited passages of Agrawal.

With respect to Claim 56, the Examiner's Answer further states that replacing shape F_2 with shape S_2 (Agrawal, col. 9, lines 6-15) discloses beautification of the imperfection. Appellants traverse this characterization. First, Appellants note that Table 3, which is provided at col. 9, lines 6-15, refers to shapes 420 and 430 of Figs. 4b and 4c, respectively, not to shapes F_2 and S_2 of Fig. 9b. Second, Agrawal teaches that shape S_2 is replaced by shape F_2 , not the opposite as stated by the Examiner. Third, the biases taught in Table 3 are OPC modifications (see, for example, col. 9, lines 16-39), not the adjustments of layout imperfections as recited in Claim 56.

With respect to Claim 57, the Examiner's Answer further states that Agrawal's level of criticality (ranking) of shapes (citing col. 6, lines 57-58 and col. 7, lines 45-48) discloses making an adjustment according to the set of actual properties

for each of the plurality of actual layout imperfections. Appellants traverse this characterization. Specifically, the passage at col. 6, lines 57-58 teaches that existing (inadequate) OPC modifications can be replaced with more accurate corrections. The passage at col. 7, lines 45-48 teaches that defining a shape by its edges can distinguish critical features from less critical features. Notably, neither of these passages teaches anything about actual properties of layout imperfections.

With respect to Claim 58, the Examiner further cites col. 8, lines 45-48 and col. 10, lines 38-41. The layout feature or first shape taught by Agrawal in these passages does not teach the recited layout imperfection as recited in Claim 58.

With respect to Claim 64, the Examiner repeats the characterization that shape 660 in Fig. 6d of Agrawal reads on the recited first - seventh edges. Specifically, the Examiner has characterized edges 661, 662, 663, 664, 665, 666, and 667 as being the recited first, second, third, fourth, fifth, sixth, and seventh edges. Appellants note that edge 663 is not substantially perpendicular with edge 662; edge 664 is substantially side-by-side with edge 662; edge 665 is not substantially perpendicular with edge 664; edge 665 is not substantially parallel to and side-by-side with edge 662; edge 666 is not substantially perpendicular to edge 665; edge 666 is substantially parallel to edge 664; and edge 667 is not substantially parallel to or side-by-side edge 661. Therefore, Appellants maintain their position that shape 660 does not disclose the limitations of Claim 64.

With respect to Claim 67, the Examiner further cites col. 5, lines 64-67 and col. 7, lines 45-48. Col. 5, lines 64-67 teaches that different bias features, i.e. OPC modifications, can be applied to features 320a and 340a of Fig. 3a. Col. 7,

lines 45-48 teaches that by carefully defining a shape by its edges critical features can be distinguished from less critical features. Notably, neither of these passages teaches a predefined ranking of layout imperfection criticality.

With respect to Claim 73, the Examiner further states that col. 12, lines 30-35 teaches that the data file can be divided into discrete sets of geometries (including only a single polygon). This dividing teaches nothing about reassembling a plurality of layout primitives into a plurality of polygons as recited in Claim 73.

With respect to Claim 89, the Examiner further cites col. 11, lines 35-36 and col. 12, lines 30-35 and 41-44. Col. 11, lines 33-36 teaches that bias features added by an OPC action could be marked with exclusion IDs, thereby selectively preventing or allowing bias application in those regions. Col. 12, lines 30-35 teaches that a single set of geometries may include an entire layer of the IC layout or a single polygon. Col. 12, lines 41-44 teaches hierarchy manager 1020 (Fig. 10a) can organize and categorize the sets of geometries according to a predefined ordering basis (e.g. minimizing the amount of data required to be processed). Notably, none of these passages teaches anything about replacing an identified shape pattern with an alternative configuration that reduces data volume.

With respect to Claim 91, the Examiner further cites col. 10, lines 64-67. Appellants traverse the characterization that shape S2 is an imperfection that is removed. Specifically, the action B that is applied to shape S2 that results in modified feature F2' is an OPC action (see, for example, col. 11, lines 6-10), not an action associated with removing a layout imperfection.

With respect to Claim 96, the Examiner further cites col. 10, lines 64-67, col. 11, lines 35-36, and col. 12, lines 41-44.

Col. 10, lines 64-67 teaches that an OPC action B (see also col. 11, lines 6-10) can be applied to shape S2, thereby resulting in modified feature F2'. Therefore, action B cannot be characterized as an action that removes a layout imperfection. Col. 11, lines 34-36 teaches that bias application can be selectively prevented or allowed by marking OPC actions with exclusion IDs. Therefore, this passage also does not teach removing a layout imperfection. Col. 12, lines 41-44 teaches hierarchy manager 1020 (Fig. 10a) can organize and categorize the sets of geometries according to a predefined ordering basis (e.g. minimizing the amount of data required to be processed). Therefore, this passage also does not teach removing a layout imperfection.

With respect to Claim 99, the Examiner further cites col. 10, lines 64-67. The action B is an OPC action (see, for example, col. 11, lines 6-10), not beautification of a layout imperfection as characterized in the Examiner's Answer.

E. CONCLUSION

For the foregoing reasons, it is submitted that the Examiner's rejections of Claims 11, 33, 37-43, and 55-99 are erroneous, and reversal of these rejections is respectfully requested.

Respectfully submitted,



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I hereby certify that this correspondence is being deposited with the United States Postal Service as FIRST CLASS MAIL in an envelope addressed to: Mail Stop Appeal Brief-Patents, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on October 25, 2005.

10/25/2005 Rebecca A. Baumann
Date Signature: Rebecca A. Baumann